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Whatever the Load
Whatever the Distance

Left: CABLE BELT rope driven conveyor. Length 7,500 feet, Lift 220 feet, 42 in. Belt at 350 ft./minute, handling 600 tons/hour of R.O.M. Coal.

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Right: CABLE BELT rope driven conveyor. Length 7,260 feet, Lift 300 feet, 24 in. Belt at 200 ft./minute, handling 200 tons/hour of chalk.

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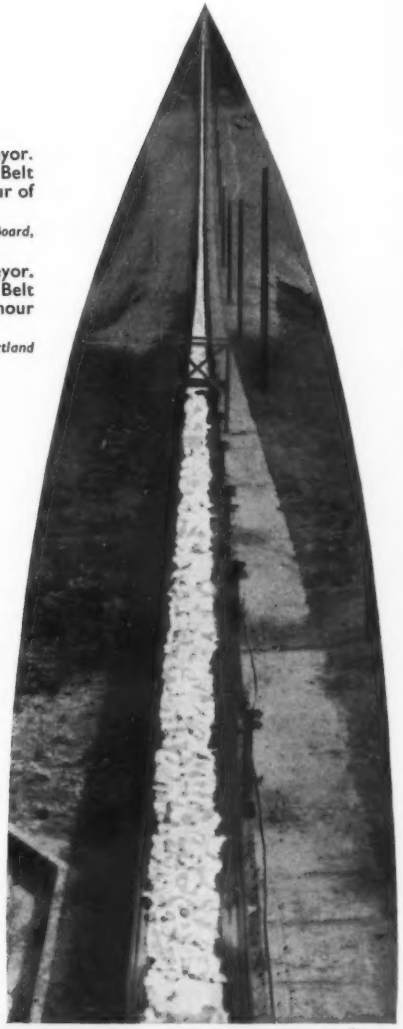

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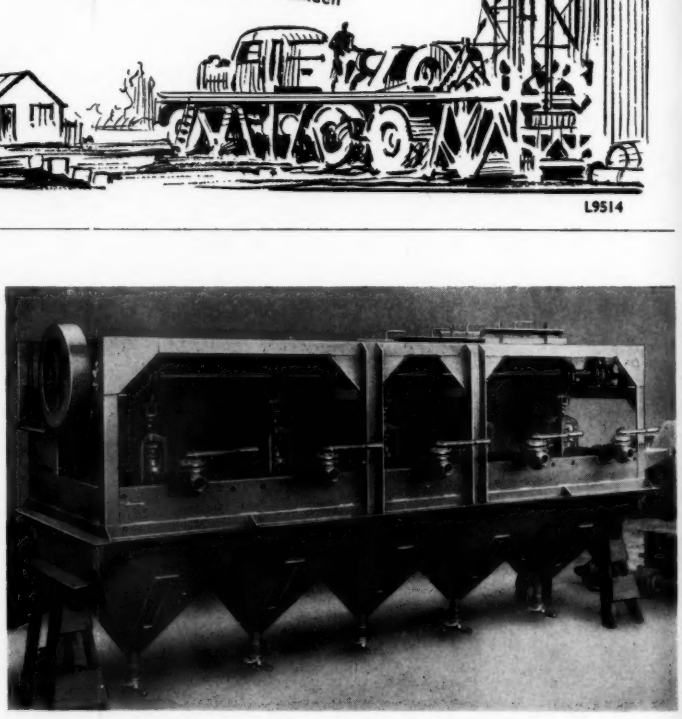

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The Mining Journal

London, December 4, 1959

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Guarantees for Overseas Investments

MINDFUL of the heavy losses incurred by shareholders in many foreign undertakings which have been nationalized with little or no compensation, private investors in the United Kingdom and elsewhere have become increasingly selective as to the countries to which they are prepared to entrust their money. Hence the flow of risk capital tends to be canalized mainly into the limited number of countries regarded as politically secure, while by-passing the under-developed countries which, by this very definition, are most in need of investment support.

Having regard to their highly strategic position in the economic warfare between Russia and the Western nations, the under-developed countries are unlikely to be starved of the capital required for their programmes of economic advancement. If private investors are chary of risking their money, grants or loans for any project considered to be reasonably sound and desirable can usually be obtained either from Western sources such as the United States and British Governments and the World Bank, or alternatively from Russia. There is a danger, however, that the recipient of money taken from the taxpayer's pocket may fail to make adequate provision for technical assistance and know-how, unless obliged to do so under the terms of the agreement. Risk capital, on the other hand, is normally accompanied by the technical assistance and know-how which are no less essential to a backward territory than monetary aid.

Risk capital has been a prime factor in the progress of the manufacturing nations. Its contributions to the economic advancement of those countries which are still industrially backward can be no less valuable, provided that the flow of investment can be suitably broadened. Assuming that in most of these countries opportunities for potentially rewarding investment do, in fact, exist, the most effective means of attracting risk capital is not the provision of added inducements but elimination of what, at present, is the greatest deterrent to private investors, namely the fear of nationalization. In the United Kingdom exporters of goods and equipment can insure themselves against financial loss to a greater or lesser extent, through non-payment by overseas customers by taking out a policy with the Export Credits Guarantee Department. What investors require is a scheme of some kind which would give similar protection to exporters of risk capital.

Early this year it was reported that a charter for overseas investment had been drawn up by Sir Hartley Shawcross, former British Attorney-General, together with a group of British lawyers, which sought to provide international agreement on safeguards for private investors.

Another step forward in this important direction is foreshadowed by the news that the Council of Europe's Ministerial Committee at its December meeting is expected to consider plans for a statute guaranteeing investments in Africa. Plans for a European-African conference to prepare an investment statute and a special fund providing guarantees against the risks of nationalization, local

disturbances and civil wars have been submitted to the Foreign Ministers' deputies of member countries.

M. Philippe Hodey, of Belgium, rapporteur of the Assembly's Economic Committee, stated that the conference would be convened by the Organisation for European Economic Co-operation, the Council of Europe, and the Commission for Technical Co-operation in Africa south of the Sahara, and both dependent and independent African States would be invited to participate. "Positive interest" is said to have been shown.

Clearly there are formidable difficulties both in the preparation of a practical and watertight scheme and in gaining the support and approval of a sufficiently large number of countries for such a scheme to be launched with reasonable prospect of success. But if the problems are great, so too are the potential gains. Even if, at this stage, we are still groping, it is encouraging that an attempt should be made to approach the problem on such a broad international basis as a European - African conference.

A statute on the lines envisaged would encourage the mining groups with their immense financial and technical resources to extend their activities to territories hitherto regarded as too insecure politically to be sound investment risks. Mining companies already operating in countries still viewed with a certain amount of distrust by the individual investor would have greater security for their existing investment and would be able to raise new capital more easily and on less onerous terms. The overseas mining industry, in fact, has so much to gain from protection against the political and fiscal hazards that it can scarcely fail to be interested in this démarche. Indeed, it is surprising that more has not already been heard on the subject from the organizations concerned.

ASARCO'S MISSION COPPER PROJECT

The American Smelting and Refining Company has appropriated $43,500,000 to prepare and equip for production a copper mine and mill in Pima County, Arizona. Known as the Mission Project, the new Asarco copper property is located about 15 miles southwest of Tucson. The project includes a portion of the San Xavier Indian Reservation which is held under permit and lease from the Papago Indian owners. It is expected that the project will not require additional financing.

Asarco has been exploring the Mission Project since 1954 and during the past five years a total of 346 holes have been diamond drilled with a total length of more than 190,000 feet. To check the diamond drilling results and to obtain bulk samples for pilot mill tests, a shaft was sunk and drifts, crosscuts and raises totalling more than 2,200 feet were driven in the ore zone. The underground work confirmed the satisfactory potential of the ore body.

Extensive market research and realistic forecasts of copper demand and consumption over the next decade were conducted by the company to determine that there are ample markets for the product of the new mine.

The Mission Project should begin producing in about three years and will have an annual output of approximately 45,000 tons of copper. The mine will be open pit and the mill will have a capacity of 15,000 tons of ore per day. When completed for production, the mine will cover approximately 250 acres. In the mineralized areas, bedrock is overlain by about 200 feet of gravel wash which is amenable to low cost stripping. Present plans call for smelting the mill concentrates at Asarco's Hayden, Arizona, and El Paso, Texas, plants and for refining at the company's Baltimore and Perth Amboy refineries.

GOVERNMENT CONFIDENCE IN COAL INDUSTRY

The new British Minister of Power, Mr. Richard Wood, had a fairly rough passage when moving the second reading of the Coal Industry Bill in Parliament last week. This Bill raises the overall borrowing limit of the National Coal Board to £700,000,000.

The Minister came in for considerable Opposition criticism when he reaffirmed the intention of the Government not to interfere in the import programme for fuel oils or to apply any form of compulsion to industry or the general public aimed at restricting their choice of fuel. For some time miners' leaders and others have been pressing for what they term "a national fuel policy", inherent in which is the intervention of the Government in favour of indigenous fuels. Such intervention would, in part, take the form of prohibitive taxation on heavy fuel oil. However, Britain does not intend to bolster the coal industry in this manner and the Minister of Power expressed the Government opinion that the steps currently being taken by the Coal Board will result in the industry taking its full share of the nation's fuel requirements.

The British N.U.M. recently met the Minister of Power and presented their 7-point plan for the industry which urged among other things restriction in the use of fuel oils; re-examination of the Atomic Energy Programme ; sharper cuts in opencast than those being made and financial help to the Board towards the resettlement of redundant colliery workers.

CANADA'S URANIUM PROSPECTS

Details of the plan for stretching out deliveries of Canadian uranium were given in *The Mining Journal*, November 13, 1959, p. 484. Briefly, the objective is to prolong the profitable life of the industry after the expiration of existing contracts in March, 1962, and March, 1963, by offering Canadian producers the opportunity to realign contracts, either by mergers or by the purchase from other companies not in a position to fulfil them. Deliveries of the purchased contracts would be made after completion of the buyer's own contract and up to December 31, 1966.

In this way contracts held by the weaker marginal operators, which might have gone by default, could be filled by a stronger company with the necessary ore reserves. Deliveries against the purchased contract would be made after completion of the buyer's own contract on March 31, 1962 or 1963, and up to December 31, 1966. There will be no stretch out of contracts unless a company so desires, and it seems probable that all producers, except those choosing to sell their contracts, will continue operating at the existing rate.

For the stronger companies such as Algom, Consolidated Denison, Eldorado and Gunnar, and possibly for some of the smaller but profitable operators, the opportunity to purchase additional contracts could prove beneficial. At the other end of the scale, companies in danger of not being able to fill their contracts, by selling the uncompleted portion to some other producer, could increase the return from their undertakings, or reduce their indebtedness to bondholders. This could help Canadian Dyno, Can-Met, Lorado, Rayrock, Stanleigh and Stanrock, depending on the terms that may be offered and their acceptance by the bondholders and shareholders of the companies concerned. There is about $270,000,000 worth of concentrates outstanding to complete the original contracts of these six companies.

The present position of the Canadian uranium contracts is surveyed on a company by company basis on page 569.

Position of the Canadian Uranium Contracts

This review of the existing situation regarding the fulfilment of government contracts for Canadian uranium is based on a survey published by " The Northern Miner " as an indication of the potential scope for the realignment of contracts.

RAYROCK MINES, which ceased production last summer due to depletion of ore reserves, delivered approximately $5,259,000 worth of uranium oxide precipitate, leaving approximately $10,500,000 of the original contract unfulfilled. The company, situated in the North-west Territory, has no outstanding capital indebtedness and on winding up its uranium mine should have about $750,000 in hand.

Beaverlodge Area

Eldorado Mining and Refining Ltd., the Crown company, operates two mines and mills, situated at Port Radium in the N.W.T. and Beaverlodge in Northern Saskatchewan. Total production from its operations since 1954 amounts to more than $148,000,000. Contracts awarded to Eldorado total $202,000,000. The company's mines are high grade operations, averaging 4.4 lb. per ton at Beaverlodge. Operating costs are in the region of $16 per ton or $4 per lb. The company has enquired about the possibilities of purchasing unfulfilled contracts.

Lorado Urnaium Mines handles ore on a customs basis from the neighbouring properties of *Lake Clinch*, *Rix-Athabasca* and *Cayzor Athabasca* as well as ore from its own property. It holds a contract for $64,380,000. Production to end October was estimated at approximately $22,415,000, leaving about $42,000,000 to fulfil. The mill is operating well below capacity, due to shortage of ore at the property of some of the shippers.

Gunnar Mines, operating a high-grade mine in the Beaverlodge area, has produced $73,265,000 worth of concentrates under its original contract for $76,950,000 which was extended to cover delivery of an additional $40,000,000. Ore reserves at the beginning of this year, to the eighth level, were estimated at over 3,000,000 tons grading 3.70 lb. U_3O_8 per ton. Development work is proceeding to open another four levels. At the end of September Gunnar had over $10,000,000 invested, chiefly in short-term securities bearing high interest rates. Receipts from sales in 1958 averaged $9.87 per lb. and operating costs at the mine about $2.70 per lb.

Elliot Lake

Algom Uranium Mines paid off all its bonds early this year. At the end of September production amounted to $135,447,362 of the original contract for $206,910,000. An extended contract for $20,000,000 has also been granted, covering 2,500,000 lb., which would keep the twin 3,000-ton capacity units operating at present rates until early 1962. Ore reserves were estimated at the beginning of the year at over 27,000,000 tons grading nearly 2.5 lb. per ton. Operating costs last year were about $4.85 per lb. at Nordic and $5.12 per lb. at Quirke, but are now substantially lower.

At the last annual meeting of *Can-Met Explorations* it was disclosed that contract fulfilment could not be achieved through present ore reserves. To the end of September, deliveries totalled $23,517,448. Total contract calls for $79,061,000.

Consolidated Denison Mines, by end-September, had produced $92,094,958 of its contract for $201,895,000. Its plant is being operated slightly below capacity and the contract should be fulfilled a few months ahead of the expiry date. Of the original financing there is still $22,000,000 of bonds outstanding. Working capital after recent payment of the initial dividend was approximately $8,000,000. Ore reserves were originally estimated at over 137,000,000 tons. Mill feed averages about 2.4 lb. U_3O_8 per ton. Last year Denison received an average price of just under $10 per lb. Operating costs were $10.77 per ton or $4.75 per lb., since reduced to about $9 per ton or $4 per lb.

Northspan Uranium Mines, which earlier this year closed its high cost operation at the Spanish American plant, produced $74,147,000 of concentrates to September 30, towards fulfilment of its $275,000,000 contract. Ore reserves available suggest that it can complete its contract by March 31, 1963, at present rate of production. This company was hard hit by overrun of capital during the mine preparation and plant construction phases and had to rearrange repayment schedule.

Milliken Lake Uranium Mines holds a contract valued at $94,525,000. By September 30 it had produced approximately $26,756,000 worth of concentrates. Ore reserves are officially estimated at 6,131,662 tons grading about 2.0 lb. per ton. At present operating rates the company should fulfil its contract with all debts retired and a nest egg of a few million dollars.

Pronto Uranium Mines had produced $41,033,952 of its original contract worth $55,000,000 by September 30. An extension worth $12,000,000 should see operations continuing at the present rate until March, 1962. The operation has permitted payment of three dividends, as well as repayment by all but $1,417,000 of the funded debt. Complete repayment of the extended contract will stretch the ore reserves. On the basis of 1958 production, operating costs averaged $11.59 per ton or $5.42 per lb. Current operating costs are much lower, being about $4.75 per lb.

Stanleigh Uranium Mining Corporation, which suffered from a late start of production due to a fire in its mill, has produced approximately $25,800,000 of its contracted $90,506,250. Operating costs are gradually being pared. Bond issues outstanding total $32,500,000.

Stanrock Uranium Mines went into receivership in May. Operations subsequently have shown an operating profit. The company had produced approximately $21,000,000 worth of its contracted $95,000,000 in precipitates by October 31, 1959. It is expected that there will be some undelivered poundage under the terms of the original contract by March 31, 1963. Apart from liabilities to unsecured creditors, there are bonds outstanding to the extent of $29,000,000.

Bancroft Area

Bicroft Uranium Mines was granted an extension, covering the sale of 260,000 lb., to its original contract for $35,805,000 It had produced approximately $22,437,000 worth of concentrate to September 30, 1959. Ore remaining above the 1,200-ft. horizon is estimated to be sufficient to fulfil the extended contract. With potential ore reserves available at depth, Bicroft is also in a position to fulfil additional contracts.

Canadian Dyno Mines has delivered approximately 621,500 lb. of its 2,700,000 lb. contract. Shipments are behind to the extent of about 300,000 lb. One possibility under tentative consideration is that of reducing the mill rate to about 700 t.p.d. and selecting higher grade mill feed.

Faraday Uranium Mines expects that the new ruling will enable it to forego its planned increase in mill capacity from 1,500 to 1,700 t.p.d., planned to ensure that its poundage would be delivered by March 31, 1962. This is another company that could expect to have reserves available if it were to acquire unfilled contracts from other producers.

The Coromant Cut

During the autumn of 1956, the Sandviken Steel Works Co. Ltd., began a series of investigations in granite in their test drilling laboratory at the Bodas Mine with a view to the development of more suitable drilling equipment especially for air leg rockdrills. This has resulted in the development of a new method of drilling known as the Coromant Cut.

THE Coromant Cut is the name applied to a new method of drilling in small drifts with lightweight air leg rock drills to give a much greater advance per round than is now accepted as normal.

In general terms, the advance per round in drifts up to 10 ft. x 12 ft. (10m^2) has been limited by the types of cuts available which have not given a bigger advance per round than 6 - 7 ft. (2 metres) with a satisfactory margin. But tests carried out by the Sandviken Steel Works Co., Ltd., Sweden, at their own Bodas Mine with the Coromant Cut have resulted in advances per round of up to 13 ft. (4 metres) being obtained with air leg rock drills.

Blasting towards Uncharged Holes

The need for a new type of cut to give greater advance per round has been more and more obvious for some time. More particularly, since the rationalization of the working cycle and the availability of more efficient loaders indicated clearly that greater advances per round could be handled efficiently and economically. Stimulus in this direction came also from new blasting techniques, while experiments with charges and the spacing and placing of holes confirmed that time spent on this problem could bring marked advantages to the technique of drilling in small drifts.

The essential feature of the new method, named the Coromant Cut, is the drilling of a slot formed by a number of small holes drilled closely together.

The aim was to obtain :

1. A better dimensional balance between the drill rod and the detachable bit.
2. A balanced relationship between the size of the hole and the power of the rock drills.
3. A minimum downwards deflection of the big drill holes.
4. A larger hole volume of the centre hole with a better shape for blasting.
5. One type of rockdrill for all the holes in the round.

Tests were made with 2 in. - 3 in. (51-76 mm.) centre holes and it was found that the best results were obtained when a guide tube, which the bit could follow when drilling the second hole, was introduced into the first hole. This guide tube was section rolled with one or several grooves and fixed in position by means of an expander; and after it was employed, there were no problems with twisted holes.

It is noteworthy that a 20-30 per cent better drilling effect, expressed in cubic inches of drilled volume per minute, was obtained when drilling the second hole along the guide tube than when drilling the first hole of the slot.

After this drilling technique had been tried out, experiments were started in the drifts of Sandviken's test mine at Bodas.

It was decided that the unloaded slot should consist of two 2¼-in. holes, as the area of these holes—approximately 8.4 sq. in. (54 cm^2) roughly corresponds to the area of a 3-in. (76 mm.) hole — about 7.4 sq. in. (48 cm^2) — and therefore could be expected to give at least the same advance per round. To achieve the necessary drilling precision, a simple drill jig, or template, was used.

The first tests at the Bodas Mine were arranged for advances of 6 ft. (2 metres) per round, the normal advance for the mine. The depth of the boreholes was increased by stages to 10 ft. 6 in. (3.2 m.) and over 67 rounds an average advance per round of 10 ft. (3.1 m.) was obtained.

Even at a hole depth of 13 ft. (4 m.) successful results were achieved. Over ten rounds the average advance was 12 ft. 6 in. (3.8 m.).

Drilling the Slot

When developing the drilling and blasting technique standard, detachable bits with 1¼-in. rope thread (Coromant thread) and round guide tubes were used. To prevent the bit from twisting around, a section rolled tube was later substituted for the round tube. This " star tube " enabled drilling to continue unhindered, provided that detachable bits with somewhat smaller flushing grooves than normal were used.

It soon became obvious, however, that there was very heavy wear on both rod and bit threads which limited the life of the equipment. Tests of other types of threads revealed that only with a conical connection between bit and rod could a satisfactory wearing life be obtained.

At present the following equipment is used :—

Rock drill	Atlas Copco BBD-50 or BBC-22
Drill rods	Sandvik Coromant ⅞-in. drill with ⅞-in. x 108 mm. shank and conical taper, L = 5.3 ft. (1.6 m.), 10.5 ft. (3.2 m.) and 13 ft. (4.0 m.)
Detachable bits	Sandvik Coromant 2¼-in. special detachable bit with taper and small flushing grooves.
Guide tube	O.D. = app. 2 in. (49.0 mm.), wall thickness = app. 1/16 in. (1.50 mm.), section rolled tube with expander, L = 8.3 ft. (2.55 m.), 11 ft. (3.35 m.), and 13 ft. 6 in. (4.15 m.).

The experiments showed that, when drilling the centre—unloaded—hole with the aid of the guide tube, the first hole must incline upwards at least 5 deg. to facilitate removal of drilling dust. A satisfactorily straight hole was ensured by keeping the rockdrill steady with a suitable feeding pressure and by keeping the rod at the bottom of the hole mouth after some feet of drilling. After hole No. 1 had been drilled and the guide tube inserted, possibly by the help of the air leg when hole No. 1 is too much deflected, hole No. 2 was drilled directly below it.

Drilling the Small Holes

After the centre hole has been drilled, the template already mentioned comes into use for the drilling of the smaller holes. Atlas Copco pusher-leg rock drills and Sandvik Coromant $\frac{7}{8}$-in. integral steels (series II) are employed for this operation.

The template comprises two steel sheets mounted approximately 2 ft. (0.6 m.) apart on two tubes welded together. After the slot has been drilled, these tubes are inserted into the hole.

The holes in the templates have exchangeable bushes. The first templates were made with six holes, but it soon proved advantageous, particularly for unskilled tunnel drivers, to incorporate another four holes in the jig.

These templates are comparatively simple and inexpensive, and one can easily be replaced by another if the drilling pattern is changed. They greatly facilitate collaring and directing of the hole. After some practice unskilled miners can drill more precisely with the aid of the template than many skilled miners can without it. The use of the template has, therefore, been of deciding importance for the success of the Coromant Cut.

Charging and Blasting

The Swedish explosives LFIV (50 per cent nitroglycerine) and LFB (35 per cent nitroglycerine) have been used on the tests. This Swedish explosive corresponds to gelatin or semi-gelatin of approximately 75 per cent strength. The blasting holes have been charged with half a cartridge 1 in. (25 mm.) and wooden sticks, 5 in. (12.5 cm.) long, placed alternately to fill the depth of the hole. This has given a charging concentration of about 0.20 lbs./ft. (0.30 kg./m.).

Fuse tape has mainly been used, although tests with electrical fuses have also been made. At these occasions, English short delay detonators have been used for 14 holes and $\frac{1}{2}$-second interval detonators for the rest of the round.

Improved results were obtained in blasting the 13 ft. (4 m.) rounds when the detonator was placed at one foot from the mouth rather than at the bottom of the drill holes.

After trial blasting at Bodas and other places, Langefors has formulated the following relationship between burden (V) and concentration of charge (L) with various widths of slot, in blasting normal Swedish granite, gneiss and other types with the same rock factor (0.4 kg. LFB dynamite per cubic metre rock), v = the other half of the opening angle :

$$L = 0.36 \, (\sin. \, v)^{-3/2} \, V$$

This relationship, giving a charge which for small burdens—4 in. to 8 in. (0.1 - 0.2 m.)—agrees with the experimental values but for greater burdens (approximately 2 ft., or 0.5 to 0.7 m.) is too high by up to 50 per cent.

In determining the positions of the pattern holes one must also allow for possible deviations if one is to achieve a successful blasting result.

If an increased advance per round is desired, it must be brought about by :

(*a*) Greater precision : deviation of drilled holes must not exceed that allowed for in drawing up the drilling pattern: *or*

(*b*) Placing the holes closer together ; but this entails greater risk of a flash-over : *or*

(*c*) A greater cross-sectional area, which can be obtained by drilling bigger holes, or more holes, or by both more and bigger holes ; *or*

(*d*) A combination of these three methods.

Advantages Summarized

Summing up, one can say that the Coromant Cut has the following advantages :

1. Possibility of a longer advance per round in small cross-sectional areas. This as a rule implies more rapid drifting.
2. A higher percentage of advance per round.
3. More uniform fragmentation, which means increased loading capacity.
4. A simple drilling pattern which can be used without alteration for various advances per round, and also for various types of rock.
5. The advance can be planned to suit the working cycle without the need for changing the drilling pattern. In this way the whole shift time can be effectively employed.
6. With the aid of the drilling template, even unskilled men can get satisfactory results.
7. A comparatively cheap supplementary outfit is all that is required, and pusher-leg rock drills of one type can be used throughout.
8. Blasting towards a slot is more efficient — and safer — than blasting towards a round hole with the same cross-sectional area.
9. Once the operators have been trained, the entire charge can be fired at once. This often means shorter working time than with a burn cut.

Conclusion

The Coromant Cut has emerged successfully from tests at Bodas and elsewhere. Now, therefore, it can be recommended —instead of burn cuts—for air leg rock drills where advances of 6 ft. to 10 ft. (2-3 m.) are required.

In particularly difficult rocks, or when advances of 10-13 ft. (3-4 m.) are wanted, the same method can undoubtedly be tried with good prospects of success ; but in these cases the slot should consist of two holes each larger than 2$\frac{1}{4}$-in. dia. or three holes each of 2$\frac{1}{4}$-in. dia.

It is worth emphasizing, however, that the results achieved largely depend on the precision with which the holes are drilled. It is therefore advisable to begin with short advances per round, firing the cut first of all. The cut may, possibly, then be improved before the entire round is fired.

When the drilling crew have become accustomed to this new type of drifting, the advances per round can be gradually stepped up until the desired length has been reached.

The technique of drilling two or three holes close together with the aid of a guide tube can be adopted with advantage for holes with larger or smaller diameters. It will be possible to drill a considerably larger volume than can be done by drilling one hole at a time with available — or conceivable — rock drills. This development again makes for more reliable and longer advances per round.

AUSTRALIAN MINE TAXATION—III

Taxing Australia's Operating Mines

Previous articles in the series discussed why mineral investment is far more hazardous than other forms of investment, and accordingly, why income tax should be on a basis different from other industries. The effect which those sections of the Australian Income Tax Act concerned specifically with the mineral industry may have on investment in the mineral industry was also reviewed

WE may now discuss the partial exemption granted under Section 23A : one-fifth of the income derived from the mining of scheduled minerals is exempt from tax until 30th June, 1960 — important minerals excluded from the allowance are lead, zinc, iron-ore and coal. Amongst the mining community this Section has perhaps received more attention over the years than any other Section of the Income Tax Act.

Section 23A was introduced during the war, when, despite the greatly increased rate of tax at that time, miners were encouraged to increase production of certain strategic minerals — the exemption of 20 per cent of income derived from mining was thus a form of compensation for the more rapid depletion of reserves. The Section has been continued since, and now applies to most minerals mined in Australia (with the important exceptions noted above) as an encouragement to mine production.

In other countries an allowance of a similar nature is known as " depletion allowance ", and is granted in recognition of the fact that, during mining, the mineral reserves are undergoing depletion, that each unit of mineral extracted therefore has a capital value, and that part of the annual revenue from the mine represents a recovery of the capital value of the total mineral extracted during the year. Depletion allowance is, therefore, rightly related to profit.

The history of " depletion " dates back to the earlier part of this century when it was recognised in the taxation laws of the United States and Canada. It has become recognized in many other countries since. Despite the similarity of the allowance under Section 23A, " depletion " as such has not yet been recognized by the Australian taxation administration.

The arguments in justification of " depletion " are well-founded, but cannot be adequately pursued within the scope of this present summary. Oversea, the amount of depletion allowance varies according to the mineral mined, but is generally greater than the 20 per cent provided under Section 23A in Australia. In Canada, the depletion allowance is 33⅓ per cent for the majority of minerals.

Nevertheless, in comparing the percentage allowed under 23A in Australia with, say 33⅓ per cent under " depletion " elsewhere, it should not be overlooked that the whole of the allowance in Australia is passed on from the company to the shareholder tax free — this is not the case with " depletion " elsewhere. In its financial result to the shareholder, a tax-free allowance of 20 per cent of a company's profits passed on in full to the shareholder, also tax free, may be little different from a 33⅓ per cent depletion allowance which is largely taxable in the hands of the shareholder.

However, the greater depletion allowance could well lead to accumulation of more funds for further development by the mining company and, for that reason, may be preferred by some even though dividends from the allowance itself may be taxable in the hands of the shareholder.

Whether or not the allowance under Section 23A should be regarded as a depletion allowance is not debated here. In Australia, Section 23A has become an important feature in mine development and production. It has a bearing not only on investment, but also on mine costs at the point of dividend distribution. These in their turn partly determine the economic ore reserves available in a mine, and thus the national reserves as a whole. In addition, they determine our ability to compete with mineral products of other countries.

In the mineral world as it is today, in which national means of protection isolate the mineral industries of many countries from the competition of international markets, Section 23A provides one of the few means by which the Australian mining industry can be helped in its marketing problems. Clearly it is essential that the Section, after 16 years as a temporary measure, should now become a permanent feature of the Australian Income Tax Act.

Some important minerals excluded from the scheduled list to which the Section applies are : lead, zinc, silver and cadmium, which together constitute the lead-zinc industry. Their exclusion relates to the fact that, since the war, lead-zinc mines are claimed to have contributed greatly to government revenue from tax on profits, and accordingly a considerable loss of taxation revenue would presumably have followed the application of Section 23A to these minerals. However, perhaps some figures will put the position in clearer perspective. In the income year 1955-56, taxable income from *all* mining companies which paid tax was £23,537,621 compared with £627,619,300 in all other companies. Net tax paid by *all* mining companies which paid tax was £8,345,105, compared with £204,506,995 by all other companies. Of course, only a proportion of the mining companies were mining lead-zinc.

The lead-zinc industry contributes far more to Australian export earnings than any other section of the mineral industry —in 1958 products of the lead-zinc industry contributed 66 per cent of the total value of mineral exports. Further, the lead-zinc group has prospects of adding greatly to oversea earnings in the future.

There has been a steady increase in production of lead and zinc since the war, but there has been a sharp fall in price in recent years. Only by the closest attention to costs will Australian lead-zinc producers be able to maintain this country's position as the world's leading producer of lead and third producer of zinc.

The years 1955-57, when the lead-zinc industry made great profits, were years of abnormal high prices, contrasted to the much lower and more normal level of prices today and, as may be expected, in the years ahead. As profits in lead-zinc mining will now be less, an allowance under Section 23A would be much smaller in relation to government's total tax revenue as at present. But plans for increased production may add 40 per cent to income from these metals; any increase above 25 per cent would more than compensate government for any present loss of tax revenue from the grant of the 20 per cent allowance under Section 23A. The provision could well prove to be a decisive factor in aiding the competitive position of lead-zinc mines in world markets, thus leading to the success of expansion plans.

By Dr. J. A. DUNN

The extension of Section 23A to the lead-zinc industry may be an important contribution to any forward looking proposals.

Section 23A is applied to operations confined to the mining lease only, and may include all treatment activities at the mine locality. However, it may be more efficient, and indeed only possible, to undertake certain operations at a considerable distance from the mine, as determined by such factors as water supply, power availability, freight costs, and market availability. Section 23A should not be a factor in determining the location of a plant ; certainly a plant located for efficiency reasons at a distance from the mine should not receive less preferential taxation treatment than a plant located at the mine. The necessity for efficient plant location is recognised under Section 23D, which exempts income from the mining and treatment of uranium ores from taxation. Similar recognition should be included under Section 23A.

Three Year Tax holiday

In recent years the suggestion has been made that profits should be tax-free during the first three years of operation of a new mine by a company. This incentive to new mine development was introduced into Canada after the war, where it is generally admitted that the allowance has contributed to the great expansion of mining in that country in recent years. A similar incentive has been introduced in several other countries, with tax-free periods ranging up to 5 years.

The full exemption granted on gold and uranium, and the partial exemption on certain other minerals under Section 23A, have a continuing significance during the life of a mine. In addition to its cost significance, Section 23A by its analogy with depletion may be said to have also a capital significance. The introduction of a tax-exempt period of 3 years would be a means of assisting a newly developed mine at just that period when the company needs the maximum assistance, when it has reached the culmination of heavy capital expenditure, its finances are weak, and it may be struggling to break into the market.

The poor returns from many mines make it difficult today to attract money into prospecting and development. Even if full recoupment of an amount equivalent to the capital expenditure were allowed before revenue surplus becomes subject to tax, the risk still continues that the mine may not make sufficient profit during its life to provide even a fraction of the interest which an investor should expect.

However, if in addition to permitting full recoupment of capital before taxation, taxable profits were exempt for a period of 3 years, the new mine would be given an encouraging start by improving the shareholders' prospect of receiving a reasonable overall interest return on the investment.

In addition, the company would be able to build up a fund just at that period when its liquid capital resources were at their lowest, so that it could meet more strongly such development, production and marketing problems as are only too common in the early years of a mine's history.

Income from Sale of Mine

Under Section 88B, whether the vendor or purchaser may receive an exemption on the sale value of a mine is a matter for negotiation between the parties. It is indeed remarkable that the benefit of a taxation exemption should be the subject of negotiation between the parties to a transaction.

The issue is straightforward enough. The value of the mine (the so-called "lease premium" in the unfortunate and unsuitable terminology applied to mining claims), is a real capital asset—either it has been lessened in value by reason of diminished reserves over a period of working, or it has been increased in value consequent on development of the orebody and on other factors. If the owner sells this asset, then the sale value should be tax free, and the buyer should be permitted to amortise it. Any element of bargaining on these grounds is to be deprecated.

It would be equitable, however, that the amount exempted should be reduced by the extent to which the original sale price had been amortised for taxation purposes.

Allowances on Dividends

Under Section 44(2), the allowance granted to a mining company under Section 23A is extended in full to the shareholder. In effect, this places the shareholder in the company in precisely the same position as an individual miner or a partnership working a mining property, and able to claim the deduction direct from assessable income under 23A.

Such an allowance as that under Section 44(2) is not common in income tax legislation oversea ; for example, depletion allowance granted to a company is not passed on to the shareholder. In some cases, however, a percentage of the total company dividend may be exempt from tax, but this is not as liberal as passing tax-free to the shareholder the whole allowance granted to the company. In the event, according to the level of tax rates, a 20 per cent allowance to the company, passed on in full to the shareholder, may, *in the hands of the shareholder*, be of equal value to a 33⅓ per cent allowance to the company but merged in the total dividend, of which, say, 20 p.c. is exempt in the hands of the shareholder.

Accordingly, perhaps it might be proposed that it could be more advantageous if the company exemption under 23A were raised to 33⅓ per cent, and in lieu of the exempt amount being passed on to the shareholder as a tax-free dividend, all dividends received from mining were granted a 20 per cent exemption.

Under the Act as at present, the shareholders may exert strong pressure on the company board to distribute tax-free income under Section 23A in full. Further, if such income is distributed to oversea shareholders, it may be subject to tax in the country of residence.

Under the alternative proposal there would be no strong pressure to distribute a tax-free dividend; in fact the necessity, often undesirable, to separate taxable and tax-free appropriations disappears. The company board would be much freer to make whatever use of company funds it believed desirable in developmental work.

Indeed, the proposal might be extended even further : a 50 per cent allowance to companies under Section 23A, with the allowance under Section 44(2) deleted entirely, would leave the bulk of shareholders in precisely the same position as at present, or as under the alternative noted above. Such a proposal, drastic though it may seem at first sight, might be claimed by some as an incalculable incentive to mine development in Australia. Certainly it would be a step in simplifying tax administration. There is, of course, the disadvantage that the larger dividend received by oversea shareholders would not pay tax to the Australian Government yet may be taxable in the country of residence—but that in itself could be an added inducement to oversea companies to build up their funds in Australia.

However, the significance of public relations should not be overlooked. Maybe the average shareholder is more attracted by a direct allowance which he deducts from his own income tax return than by an allowance (of which he is only indirectly aware) deducted in the company accounts.

Under the Income Tax Act as at present, unless an actual reduction of paid-up capital is made by direct return of capital

to the shareholder—an action which a company could normally not contemplate—the shareholder in a mining company can only look for a return of his capital from the dividends he receives and which are taxed. If he is lucky, he may receive some tax-free return of capital from the sale of assets on liquidation — but assets at an outback mine may have little sale value. If the mine had not been sufficiently profitable, the shareholder may well find that his dividends have not even returned to him his capital, and personal taxation on the dividends may have further reduced that return of capital.

This additional hazard, that taxation adds to the risk of the mining shareholder's recoupment of capital, might perhaps be overcome by permitting dividends, *up to the amount of paid-up capital only*, to be exempt under Section 44(2). Necessarily, the exemption could apply to contributed capital only, and would exclude bonus shares issued out of accumulated funds.

But if this exemption were granted under Section 44(2), the position could arise in which, after paying a tax-free dividend, the company called up further capital; and one-third of such further contributed calls would be tax-free to the shareholder as at present. Thus, a company might keep reserve funds at a minimum but continually increase paid-up capital, leading to unjustified further tax-free dividends to shareholders.

To avoid this possibility, alternatively the present exemption on one-third of calls under Section 78(1) (*b*) might be raised to 100 per cent. Thereby the further hazard, that personal tax on dividends may add to the risk of recoupment of invested capital, is removed *at the time the shareholder makes the investment*. Under this alternative, no deduction would be made from dividends for recoupment of paid-up capital, and any subsequent return of capital by the company during operation or on liquidation would be taxable. In other words, the shareholder receives in advance the tax allowance for return of paid-up capital.

The initial cost of this to government would be represented by the additional exemption on calls, but this would be partly compensated subsequently by taxation on any actual return of capital, such as on liquidation.

Investors who purchase mining shares subsequent to the subscription of paid-up capital would not benefit from the proposal, and would have no means of securing the return of their invested capital. But government cannot legislate for this class of investor who may, in any case, be expected to discount within the share price the risk of recoupment of his investment.

As a direct incentive to invest in new mining development, the advantage of the proposal is obvious. If the mine fails, then the shareholder's loss is reduced at any rate by the extent of his tax exemption. If the mine is a success, government taxes in full all repayments of paid-up capital.

Dividends from Mine Sale

It may be suggested as equitable that dividends from the sale of a mine should be exempt under Section 44, in the same way as dividends from the sale of a prospect under Section 23(p) are exempt.

Summary

Summarizing the discussion in this series of articles, it is desirable that taxation allowances should be so arranged as to :

1. Attract money into exploration by offering tax exemption on the money invested and allowances on the rare successful finds, having in mind that exploration is a straight gamble.
2. Attract money directly into mining, in competition with less hazardous industries (e.g. by exempting all contributions to paid-up capital—of course all other taxation allowances also indirectly encourage mine investment).
3. Ensure that taxation does not add to the financial hazards of mining (e.g. by granting exemption on profits up to full capital recoupment).
4. Increase mineral resources (e.g. by reason of the effect of Section 23A on reserves).
5. Assist new mines through their early periods of difficulty (e.g. the Canadian initial 3-year tax holiday).
6. Provide some alleviation to the hazard of marketing competition (e.g. Section 23A).
7. Recognize that the term " lease " as applied to a mine is fundamentally different in significance from the term as applied to other forms of property.

These desiderata have been implicitly recognized in principle by certain Sections of the Australian Income Tax Act, but they have not yet been recognized in full. Over the years, the Act has been greatly improved in those Sections relating to encouragement of exploration and mining, and further improvements will undoubtedly be made. Indeed, the writer ventures to believe that, at some distant date, enlightened governments may extend the present total tax exemption on gold and uranium to certain other minerals in the interests of development and national reserves, looking to revenue from related employment and consequent associated industries as adequate compensation for the exemption.

Importance of the Proposals

The writer would regard the main proposals discussed in these articles as of equal importance in their impact on different phases of mine investment. But, looking to the broad development of *new* mineral resources, one proposal stands out : 100 per cent exemption on paid-up capital invested in exploration and in mining. For *established* mines, the extension of 23A to all minerals, and to treatment off the lease, would provide the greatest assistance to national mineral development and export revenue.

It cannot be emphasized too strongly that the mining regions developed to date are very limited in relation to the total area of Australia, and to the scope for further exploration. Vast areas await detailed mineral exploration and development, but at very great cost. Under the Australian system of enterprise, taxation allowances provide the most important means available to government of encouraging investment in such development.

The figures quoted illustrate that taxation revenue from mining in 1955-56 was quite minor when compared with taxation revenue from other industries, and that the proportion of total net tax to total income in mining is higher than the relevant proportion in all other industries. It is also of interest to note that, in the same income year, losses, as calculated for income tax purposes, were at the relatively very high level of £3,864,020 in mining companies compared with £23,566,448 in all other industrial companies—although, of course, subject to qualification, these figures emphasize the very high investment risk in mining in comparison with other industries.

The small taxation revenue from mining emphasizes that any reduction in revenue which may result from proposed further allowances would be insignificant in relation to the ultimate development of our natural resources. Ultimately, of course, whatever reduction there may be in taxation revenue from mining today will be repaid many times by taxation revenue from developments in the future.

Machinery and Equipment

Shaft Sinking under Hot and Cold Conditions

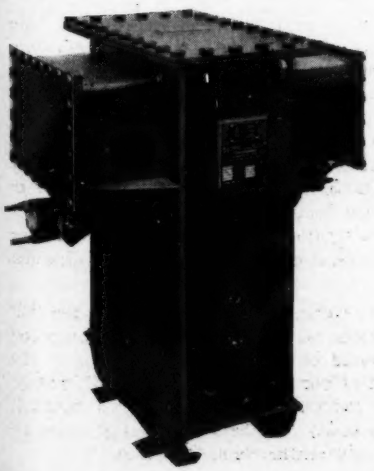
The presence of hot water brought on by volcanic action nearby has severely complicated mining in the Limon gold mine in Nicaragua. Routine pumping problems have been multiplied and ventilation is a major problem. The enclosing rock is so hot that 20 per cent of all the power generated at the mine is consumed by forced ventilation.

At this 400-ton gold-silver producing mine, of Empresa Minera de Nicaragua, the main veins are located along prominent fault areas. Mining is generally done by cut and fill and square set methods, although shrinkage stoping has recently been used. Apart from isolated reservoirs, hot water was first encountered on the 634 level, 67 ft. below sea level, when the main vein was intersected by cross-cutting from the main shaft. This water had a temperature of 118 deg. F. and a head of 30 ft.

In the main shaft operation, however, the inflow of water did not exceed 40 g.p.m. until 65 ft. of vein had been exposed. Drilling at this point brought forth no water, but when the round was blasted it yielded an estimated 550 g.p.m. at 162 deg.F. and this was subsequently increased to 166 deg.F. This quantity of water in itself was not too great a problem, since the sister mine La India was at the time draining 10,000 g.p.m. through its San Lucas tunnel, but water at only 46 deg.F. below the boiling point presented special difficulties that proved impossible to cope with at the time and the shaft flooded almost immediately to within 80 ft. of the collar.

In contrast modern mining equipment has been found adaptable to a unique ice mining operation in northwestern Greenland. As part of a research programme on arctic survival by the U.S. Army Corps of Engineers, ice tunnelling has been carried out to determine the feasibility of excavating large underice openings and the tools used so far have ranged from black powder to continuous coal mining machines.

Associated Electrical Industries Ltd. has recently extended its range of flameproof mining transformers by introducing additional distribution units up to 20 kVA., 3-phase, 3,300-volt class. This is covered by Ministry of Power flameproof certificates Nos. 4342 and 4343 for groups 1 and 2 gases respectively. The range now covers lighting units up to 1,000 kVA., 3,300-volt class; distribution units up to 20 kVA., 3,300-volt class; and mobile units up to 500 kVA., 11,000-volt class. Illustration shows an A.E.I. 20-kVA., 3,300/550-volt, 3-phase flameproof mining transformer



WORLD'S BIGGEST MINE HOIST

What is claimed to be the world's largest mine hoist is being delivered shortly by Asea to the Soviet Union, according to the Swedish company's house organ. It is intended for a double hoist system with a loading capacity of 50 tons per skip and forms part of a delivery of nine hoisting units.

The hoist drum weighs 49 tons and its two skips weigh 40 tons each. For lifting the drum out of the contruction hall it was neccessary to build new traversing gear. In spite of the heavy capacity of the pulley unit its diameter is only 4 m. (14 ft.), as its hauling capacity is distributed over eight wires, as against a maximum of four wires in other large-size driving pulleys.

The driving speed is 10 metres per second (33 ft./s.) at a depth of 900 m. (3,000 ft.). The motor effect is 9,000 h.p., derived from four separate units which are connected to the driving wheels by means of two double-reduction precision gears. The motors are connected to the transformers by Leonard gearing. However, the mechanical equipment is designed for an ultimate depth of 1,300 m., which will mean an increase in the driving speed to 14 m. per second at a simultaneous increase in the motor effect to 12,000 h.p.

The delivery of the hoists, which are wholly automatized, includes Asea-made skips, measuring pockets, wires and underground transportation equipment for conveyance of the ore from the crushing stations. The latter are to be operated by an Asea automatic hopper system, adjusted to the automatic hoisting method.

STEAM WINDER TO BE REPLACED

A steam winder which has been in service for over 60 years at the No. 1 shaft of Creswell Colliery, near Worksop in the East Midlands Division of the N.C.B., will be replaced next summer by an English Electric 1,800 h.p. a.c. winder.

The new winder, sited in a new engine house built behind the existing one, will be of the double drum type for balanced winding from the High Hazel Seam at 1,006 ft. and the Three Quarters Seam at 2,229 ft. Winding two mine cars in the single deck cage at 39.9 ft. per sec., it can raise 3,590 tons from the higher level or 2,500 tons from the lower level in a 12½-hour day. The colliery has an output of over 500,000 tons a year. The winder will be equipped with a liquid controller using closed circuit water cooling and entire control will be from a desk fitted with two miniature depth indicators.

Robey and Co. Ltd., of Lincoln are the sub-contractors for the mechanical equipment.

The interest of the British mining machinery manufacturer in supplying the overseas market is wide enough in its concept to embrace every type of mining equipment. The accompanying photograph shows an African female digger working at the Tarkwa diamond deposits in Ghana. The shovel is one of a consignment recently supplied to this field by English Tools Ltd., of Wigan

EUROPE'S LARGEST ORE-DRESSING COMBINE COMMISSIONED IN U.S.S.R.

A Tass Agency report states that, on November 5, Europe's largest combine for dressing ferrous quartzites, with an annual capacity of 4,500,000 tons of concentrate, was commissioned in the Krivoi Rog mining basin, in the Southern Ukraine. This is the first of five large combines which are to be commissioned at Krivoi Rog during the current Seven-Year period, ending in 1965. All production processes are fully mechanized and automated, the charging of ore into the hoppers being controlled with the aid of radio-isotopes, and the entire combine is controlled from a central panel. Multiple-shaft magnectic separators, of the latest design, turn out a concentrate containing 62.74 per cent of iron, from ores containing only 32 per cent, which compares very favourably with the concentration of 59 per cent, obtained hitherto.

The belting for the conveyor has been supplied by B.T.R. Industries Ltd., and also by East German concerns, while all other technological equipment is of Russian design and manufacture.

MINING MISCELLANY

An ore-hoisting apparatus, capable of lifting more than 1,500,000 tons of ore a year from underground to the surface, has been completed at the Shanghai Mining Machinery Works. It is now planned to produce nine more of these at the same works by the end of this year.

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The Government of Kashmir has decided to form a State Mining Corporation with a capital of Rs.5,000,000, to exploit the state's mineral deposits on a large scale. A mining section is already functioning under the State Industries Department, and the government may also set up a separate department for mineral survey. The Corporation plan to commence operations with large-scale exploitation of the Kalkot coal mines in Jammu and the Mehama lignite mines in the Kashmir valley. Present annual output at Kalkot is 10,000 tons of coal, but it is stated that this could be increased to 100,000 tons.

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It is reported from South Greenland that uranium deposits have been found in a wide area, in concentrations of up to 1 kg. per ton.

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Surigao Consolidated Mining Co., in the Philippines, has acquired three copper and two iron properties, according to an announcement by the president of the company, Mr. Otto F. Weber. The newly acquired concessions are: Guimaras, Pangasinan and Lluch copper properties; and Santa Teresita and Pioneer, iron properties. The company's technical staff consider that the iron properties and the Lluch copper concession, all in Zamboanga del Sur, appear to have the greatest promise, and the company is therefore concentrating its main efforts there. Negotiations have been opened with a Japanese company to finance the development of the iron properties.

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Holland's only lignite mine, at Kerkrade, is expected to close before the spring of 1960, owing to exhaustion. A new concession has been granted for the mining of lignite in a nearby area of about 350 acres at Rimburg. Reserves of lignite in this area are estimated at 2,000,000 tons, sufficient for ten years.

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A new company, Geotecnica e Minas Limitada, has been formed in Portuguese East Africa, with its head office at Lourenco Marques, for prospecting and trading in minerals. Delagoa Bay Investment Co. of Johannesburg is one of the partners of this company, which has a declared capital of Esc. 5,000,000 (£62,500).

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In a recent interview, the Thailand Minister of Industry is reported as saying that he was changing his country's long standing policy of reserving mineral resources until such time as the Thais might be able to exploit them for themselves; in future he would allow foreign exploration and exploitation of Thailand's mineral resources. He was, therefore approving a request by a Japanese concern to explore for iron deposits, with a view to mining and setting up a steel industry. The survey would not be made in the Kanburi Province, where the Krupp survey was carried out last year. He considered unlikely that deposits would be found adequate to support an economically feasible steel plant, but the Japanese concern would be permitted to export the ore.

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The Bethlehem Copper Corp. Ltd., is reported to have asked two Japanese firms to contribute one-third of the development cost of the $15,000,000 project of bringing a copper property in British Columbia into production. The Canadian property is estimated to have a possible potential of between 20,000,000 and 40,000,000 tons of copper ore, grading from 0.8 to 2 per cent copper. The two Japanese firms are continuing separate negotiations with the Canadian company.

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The Chilean copper mine, La Disputada, a subsidiary of Penarroya, has informed the Chilean Finance Minister that the group intends doubling its output, currently running at 12,000 tonnes a year. This will require investments totalling about $7,000,000.

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American Smelting and Refining Co., has reported the intersection of a new silver-bearing vein at a depth of 3,000 ft. at the Galena Mine near Wallace, Idaho. The vein is in a previously unexplored section of the property, north of the Polaris fault. Current production of silver at the Galena mine and most other properties in the Silver Belt area has been from ore structures south of the Polaris fault.

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The world's largest plant for the direct reduction of iron ore to sponge iron is under construction in Monterrey, Mexico. The plant will use the new HyL process to reduce iron ore by direct contact with hot, reformed natural gas in batch-type reactors with a daily output of 500 tons of sponge iron. Production is scheduled for early in 1960. This is the second HyL plant to be built. The first has been operating on an adjacent site since 1958 by Fierro Esponja, with a daily output of 200 tons.

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The Legislative Council of Mozambique is reported to have approved a Bill exempting new local industries from taxation. Mining and manufacturing industries with capital from Esc. 5,000,000 to 20,000,000 will be exempted for six years; those with capital from Esc. 20,000,000 to 50,000,000 for eight years, and companies with higher capital for ten years.

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Mr. Clyde Weed, president of the board of Anaconda Co., has announced plans for the construction of a copper refinery at the port of Chanaral in the northern part of Atacama Province, Chile. Construction will start about the middle of 1960.

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In its monthly survey, the Paris Chamber of Commerce forecasts a near-term increase of 10 per cent in French alumipium industry expansion.

COMING EVENTS

The Institution of Mining Engineers has issued the following list of fixtures:

The Summer Meeting, 1960, will be held in Cardiff on June 29 and 30, and July 1. Lectures to be given will include: "The degradation of coal in power-loading", by G. V. Standerline, and S. Islwyn Evans; and "Pulmonary disability among coal miners, with special reference to the pneumoconiosis field research" by Dr. John Rogan.

Manchester Geological and Mining Society, Wigan Mining and Technical College, January 7, 1960, at 4 p.m. "Coal measures proved underground in cross-measures tunnels at Bradford Colliery, Manchester" by D. Magraw and M. A. Calver.

Midland Institute of Mining Engineers, Royal Victoria Hotel, Sheffield, January 7, 1960, at 2.30 p.m. "Layering of firedamp in longwall workings", by E. J. Raine.

Mining Institute of Scotland, Mining Laboratories, 79 Grassmarket, Edinburgh. January 20, 1960, at 5.15 p.m., "Mining difficulties in Scotland and their methods of treatment" by R. B. Dunn.

South Wales Institute of Engineers, The Institute, Park Place, Cardiff. January 14, 1960, at 6 p.m., "The construction of shallow tunnels and deep culverts", by G. A. Jones.

Southern Counties Institute of Mining Engineers, 3 Grosvenor Crescent, London, S.W.1. January 8, 1960, at 3.30 p.m., "Headframes and winder towers", by J. G. Dowdeswell.

The Institution of Mechanical Engineers will be holding meetings with lectures and discussions, at the Institution on the following dates during December: 8 Automobile Division; 9 Steam Group; 10, Industrial Administration and Engineering Production Group; 16, James Clayton Lecture. All meetings start at 6 p.m.

The South Wales Institute of Engineers have decided on March 17, 1960, for the paper "Large Diameter Boreholes for Ventilation and Staple Shaft Sinking" by J. H. Pedley.

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The Institution of Civil Engineers are organizing a visit to the Civil Engineering Works of the National Coal Board in the Neath area on April 22, 1960. This will be followed at the Town Hall, Neath, by a paper on "Surface reorganization of a group of colleries" by G. A. Jones.

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It is announced by Birlec Ltd., that, with effect from January 1, 1960, the company's name will be changed to A.E.I.-Birlec Ltd. The change coincides with the final reorganization of the structure of the parent company, Associated Electrical Industries Ltd., into several product divisions. The internal organization of Birlec Ltd., will not be affected. The name of the associate company, Birlec-Efco (Melting) Ltd., will not be changed.

Publications Received

S. G. Iron. The Mond Nickel Co. have produced a further publication in the series dealing with the development of S. G. Iron, which is fully illustrated, and describes in detail its properties, listing a number of important applications. This publication may be obtained free on request from The Mond Nickel Co. Ltd., Publicity Department.

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Russian Patents Gazette published monthly by Technical Information Co. London, has been accepted as the English-language medium for keeping abreast of newly-published Russian patents. Concise abstracts are arranged under convenient subject headings, and copies of the original Russian patents, with special low-cost translations into English, are available from the publishers. Subscriptions to the monthly publication are: *Russian Patents Gazette* (Comprehensive) £32 p.a.; General, Mechanical & Electrical Section only, £20 p.a.; Chemistry & Chemical Engineering Section only, £20 p.a.

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Molybdenum Disulphide in Action, An illustrated booklet giving information and applications of this engineering material has been published by Moly-Paul Ltd., and can be obtained free from them on application.

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Fourth Annual Symposium on Mining Research, Bulletin of University of Missouri School of Mines and Metallurgy (Mechanical Series, No 97). The use of ammonium nitrate explosives is increasing rapidly and interest in their theory and application is widespread. Most of the papers presented in this symposium were concerned with this subject, and they deal with both fundamental theory and its application to intelligent explosives design.

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Exporting to the Middle East. A booklet, published by the Advisory Council on Middle East Trade (A.C.M.E.T.), describes the part played by A.C.M.E.T., operating closely with the Government, to help British exporters to benefit from the trading opportunities in the Middle East. Copies may be obtained free of charge, on application to the Board of Trade.

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Silicosis—What it is and how it can be prevented. Booklet published by McIntyre Research Foundation of Toronto, which has been prepared for the most part in layman's terms, and should prove helpful to anyone interested in silicosis and its prevention.

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Annual Report of the Overseas Geological Surveys 1957-58, by Dr. F. Dixey, Royal 8vo, 46 pp. 7 plates. H.M. Stationery Office, London (Price 2s. 6d. net, by post, 2s. 11d.)

This is the first annual report of the Director of Overseas Geological Surveys to be issued as a separate publication for the convenience of those interested in the development of British overseas territories. Recent progress is summarised concerning the activities of the Headquarters Organization in London, and of 17 Geological Surveys overseas. A comprehensive index to mineral occurrences is provided.

Personal

Sir Ronald Prain, chairman and president of Rhodesian Selection Trust, Ltd., has been elected president of the council of the Institute of Metals from March 29, 1960.

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Mr. John D. Bradley, president of the Bunker Hill Co., was killed in a car accident near San Francisco last week.

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Sir William C. Fenton, M.C., J.P., chairman of British Belting and Asbestos, Ltd., is relinquishing the office of managing director of the company which he has held since 1935. Mr. F. Pearson has been appointed to this position.

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Mr. J. H. Sinclair, at present assistant manager at Chibuluma Mines Ltd., has been appointed first Joint Secretary to the Mining Employer's Committee of the Joint Industrial Council.

Cementation Group's Copperbelt Contracts

IN 1958 the sinking of new shafts to open up the £14,000,000 Mufulira West project was put in hand. The mine company, in order to expedite work on the shafts, decided to engage outside specialists and in June, 1958, the contract for sinking Prain Shafts 11 and 12 was awarded to The Cementation Co. (Rhodesia) Ltd. Early in 1959 this company was awarded further contracts for sinking the two shafts Nos. 13 and 14. The value of the work for the four sinkings amounted to over £800,000. All four shafts are circular, concrete lined.

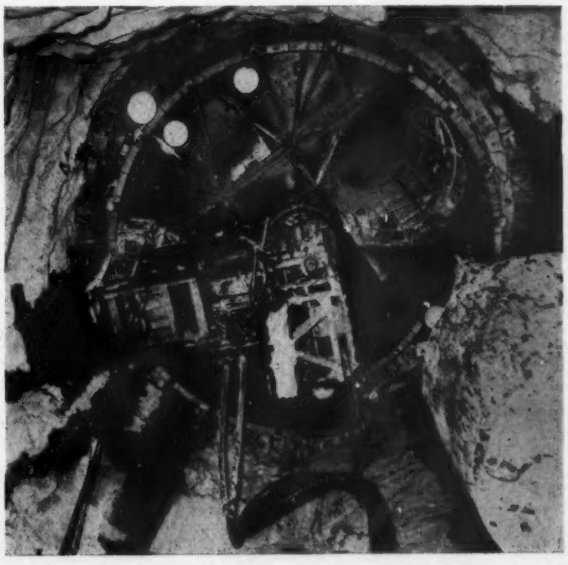
The Prain No. 12 shaft, designed as a service shaft, is situated 95 ft. to the north of No. 11. It is 22 ft. in dia. lined with 15 in. of concrete to a finished depth of 2,750 ft. The contract for No. 12 shaft was awarded in June, 1958, and the shaft was completed with finished depth 4½ months ahead of scheduled time in mid-September, 1959. During this time seven double-sided and four single-sided stations were cut and the average footage including station cuttings was 227 ft. per month. The best footage obtained in one month was an advance of 262 ft., plus the cutting of a double sided station. For cleaning purposes a 20 cu. ft. cactus grab was suspended below a specially designed three-deck stage, but unconventional surface muck-handling facilities were required since it was not possible to cut a suitable opening in the concrete headframe for installation of chutes.

Full kibbles were detached from the rope at collar elevation and transported by means of a Mono Rail to a convenient position for tipping into a Turnapull. Using this method of muck disposal, it was found possible to reduce the number of holes drilled per round since rocks as large as the kibble could be loaded.

Prain No. 11 shaft is also 22 ft. in dia. with a completed depth of 2,708 ft. Full-scale sinking of this shaft started at a depth of 215 ft. in mid-March, 1959, and the shaft was completed together with 8 single sided stations 8 months before the due date in mid-October, 1959. The shaft averaged 331 ft. per month overall with a best monthly figure of 400 ft. This comparatively high rate of sinking was mainly due to the hoist, which had a rope speed of 2,000 ft. per min. as compared with 1,100 ft. per min. in the case of the No. 12 shaft. The sinking equipment included a 3-deck stage and mechanical cleaning.

No. 13 shaft is 16 ft. in dia. lined with 15 in. of concrete to a final depth of 1,057 ft. Sinking commenced at the beginning of March and was completed together with 3 stations ahead of schedule in July. Sinking equipment included a 2-deck scaffold and a hoist capable of raising a 3-ton load at 800 ft. per min. Cleaning was by hand.

No. 14 Shaft is 18 ft. in dia. and is to be sunk to a depth of 2,800 ft. High-speed sinking will commence in March, 1960, at the present depth of 600 ft., following installation of the hoists, and the shaft should be down to depth in August next year.



The operations of The Cementation Co. (Rhodesia) Ltd., at Mufulira. An underdeck view showing the mucking unit

Metals and Minerals

Beryllium as a Space-age Metal

Rapid progress in the technology of beryllium and in the development of new markets for this young metal continues to be reflected in recent reports from the United States. This year is regarded as certain to witness the biggest rise in earnings in the history of the beryllium industry, but producers believe that next year will bring even greater gains. It is considered that beryllium may find more use in nuclear work and missiles, while its potential scope in the aircraft and motor car industries is regarded as almost unlimited.

Both civilian and defence requirements are expanding at a rapid rate. Experimental work on making ductile beryllium is being accelerated, as well as the search for beryl deposits and for efficient methods of handling the ore. It is anticipated that U.S. consumption of beryllium oxide (10 - 12 per cent) may approach 8,000 s.tons this year. World production in the past three years has averaged about 10,000 tons per year.

The prediction has been made that within the next two years space age work may absorb significant quantities of this metal. Less than half the weight of titanium, and only 70 per cent that of aluminium, beryllium surpasses both these metals on a strength per pound basis. New processing refinements are expected to make aircraft quality beryllium extrusions economically available in popular sizes, shapes and lengths. The feasibility of extruding pure beryllium was undisputedly proved at a recent aeronautical meeting in Los Angeles, at which advanced techniques for this purpose were described. Programmes are being developed by fabricators in close co-operation with the Air Force.

Since experimental beryllium extrusion billets cost more than $100 per lb., processors naturally seek to utilize the metal wisely and sparingly. It is predicted, however, that increased deliveries for aircraft and missile use will result in drastically reduced prices. In order to save material, one fabricator backs up the beryllium metal billet with a far less expensive alloy, so as to eliminate scrap in the form of billet ends.

Missile and satellite fasteners made from the nearest thing to an anti-gravity structural metal yet developed will be produced in a new facility recently opened by the Standard Pressed Steel Co. This $100,000 pilot plant operation is the first in the fastener industry to fabricate featherweight beryllium into threaded parts. Since its weight is only one-fourth that of ferrous metals and present-day superalloys, a beryllium bolt that can support a load of 125,000 p.s.i. is the equivalent, on a strength-to-weight basis, of a steel bolt with 500,000 p.s.i. tensile strength. The strongest steel bolts currently available, however, are rated at only 260,000 p.s.i.

Further development work will be required to harness the full capabilities of beryllium to the production of fasteners. New fastener designs and metal processing techniques designed to capture more of the inherent strength of beryllium are under investigation.

Beryllium is extensively used to harden other metals. For example, nickel with the addition of 1.8 per cent beryllium can be heat treated to give values of tensile strength as high as 260,000 p.s.i. A small amount of beryllium hardens gold. Recently it was reported that North American Aviation had been granted a patent of its Tens-50 aluminium alloy, which can be cast to the higher strengths necessary for advanced missile and aircraft components. An important feature of the alloy's composition is the addition of a small amount of beryllium. This new alloy is being used for the majority of aluminium castings in liquid rocket engines. Automotive pistons, aircraft pylons, high-pressure valves, hoist bodies, jack hammer cylinders, high-speed impellers, compressor bodies and wave guides are also being economically produced in this material.

The traditional use of beryllium in alloy form is, of course, in the manufacture of electrical contact springs in combination with copper. Higher prices for beryllium copper mill products and remelt ingot were announced a few weeks ago by the Beryllium Corporation. The price changes include increases of 5 c. a lb. in most wrought product base prices and in remelt ingot prices.

On the production side, it has been reported that Brush Beryllium is to build a $500,000 plant in Hayward near San Francisco, covering 25,000 sq. ft., which is expected to start operations by April next year. Brush's existing plants are located in Ohio, and its central offices in Cleveland.

British interest in beryllium was most strikingly demonstrated earlier this year by the formation of Consolidated Beryllium Ltd., owned jointly by the Imperial Smelting Corporation and the Beryllium Corporation, which was reported to be planning the erection of the largest beryllium metal plant in the world.

EXPANSION SCHEME FOR STAINLESS STEEL

Of interest to producers of nickel, chromium and other ingredients of stainless steel is the news that a £2,000,000 expansion scheme for Shepcote Lane Rolling Mills, Sheffield, owned jointly by Firth-Vickers Stainless Steels and Samuel Fox and Co., has been approved by the British Iron and Steel Board and the British Iron and Steel Federation. The new plant is being installed to meet an increasing demand for stainless steel — a demand which has been particularly apparent over the past three months and which stems from a greater use of the material by manufacturers of consumer products.

Stainless steel is the largest outlet for nickel, accounting for 27 per cent of total Free World consumption in 1958. Hence, the rising demand for this material on both sides of the Atlantic is a particularly encouraging pointer to the continued expansion of nickel consumption.

RUSSIA'S ALUMINIUM PROSPECTS

According to Mr. G. A. Vedensky, of the U.S. Institute for the Study of the U.S.S.R., Russia exported 114,900 tons of aluminium last year compared with 85,400 tons in 1947, when she ranked second only to Canada as a world exporter. In 1957, over 70 per cent of Soviet exports went to the Satellite countries.

Mr. Vedensky said that an approximate estimate of Soviet aluminium output could be compiled from various Soviet sources. He estimated output in 1950 at 200,000 tons, rising to 560,000 tons in 1955 and 930,000 tons in 1958. With an increase of 208 per cent scheduled under the Seven Year Plan, output should reach 2,600,000 tons a year in 1965.

There are at present 10 working aluminium plants in the U.S.S.R. and three more are in the process of construction. It is planned that Siberia and Kazakhstan will become the main suppliers of aluminium, ousting the European part of the U.S.S.R. and the Urals. By 1965, the chief purveyors of aluminium will be Krasnoyarsk, the village of Shelikhovo near Irkutsk, Kuznetsk in the RSFSR, and Pavlodar in the Kazakh SSR.

When these plants were completed, said Mr. Vedensky, there should be a 21 per cent reduction in production costs compared with 1959. At present, one ton of aluminium costs 10 per cent less to produce than one ton of copper, 35 per cent less than lead, and 20 times less than tin. In addition, the Soviet cable industry claims that one ton of aluminium can substitute for four tons of copper while the manufacturing cost of aluminium is much less than that of other non-ferrous metals.

It was further stated that Russia was using aluminium in an ever-widening range of industries. She was contemplating a switch to the use of aluminium in the building industry. The machine-building industry had begun to use aluminium instead of steel in the construction of trucks and passenger cars, as well as in passenger railway coaches. Aluminium is also used in Soviet shipbuilding and industrial piping. Manufacturers of cables and batteries no longer use lead, but aluminium, plastic materials and nickel.

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Meanwhile, it appears to be becoming increasingly difficult to secure new supplies of Russian or other Iron Curtain aluminium in the United Kingdom. In any case the price of this material, which has been gradually improving, is now such that fabricators are scarcely likely to be interested in going to the additional trouble involved in purchases from Eastern sources.

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Aluminium Ltd. has confirmed a local

Press report that its principal subsidiary, Alcan, is now supplying aluminium to agencies in Mainland China. Sales made by Alcan (Asia) Ltd., from Hong Kong started about two months ago and are expected to reach about 5,000 tons in a 12-month period. It may be recalled that early this year Alcan decided not to proceed with a plan for the export of 2,200 tons of aluminium to China after the necessary government licence had been obtained.

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The Ranshofen (Upper Austria) aluminium smelter of the Vereinigte Metallwerke Ranshofen-Bernsdorf AG is expected to produce some 59,000 tonnes of virgin aluminium this year compared with 50,000 tonnes in 1958. In the first 10 months of this year exports amounted to some 26,000 tonnes, of which a large part went to the U.S.

TITANIUM OXIDE

Despite the prominence which has been accorded to the progress of titanium metal in recent years, it is, of course, the production of titanium oxide which still constitutes by far the largest outlet for producers of ilmenite. The chief use of titanium oxide is as a source of titanium pigments, which are used mainly in the manufacture of paints but also in other products including paper, floor coverings, rubber, ceramics, plastics and rayon. The demand for titanium products has been steadily rising and in August this year the larger U.K. producer, British Titan Products, announced that it would increase the capacity of its Grimsby plant by 15,000 tons, bringing its total capacity in this country to 105,000 l.tons annually. Now comes the news that Laporte Industries is to spend £3,500,000 on additions to the capacity of the Stalingborough (Lincs) titanium oxide plant of its subsidiary, Laporte Titanium. The extensions, which the group expects to finance out of its own resources, will raise capacity from 30,000 tons to 50,000 tons annually over a period of three years.

A few weeks ago the Board of the British Titan Products Co. confirmed that, under global expansion schemes costing about £14,000,000 it would build several plants providing capacity for more than 60,000 tons a year, including one to be established at Umbogintwini, near Durban, in association with African Explosives and Chemical Industries Ltd. The South African plant is expected to be completed by about 1962 and will have a capacity of 10,000 tons a year.

WOLFRAM IN REVIVED DEMAND

After the return of quieter conditions, some revival of demand has been reported in the London market for wolfram ore, but business maturing is still within the range of from 147s. 6d.-152s. 6d. per l.ton unit c.i.f. Europe. The business done has involved open market supplies as well as those available from British Tungsten, the selling agents for Board of Trade ore.

LOWER QUICKSILVER PRICE

The London ex-warehouse quicksilver price has latterly been indicated at from £71. 10s. to £72 per flask, compared with £72 over the past few weeks. The slightly softer tone is attributed to supply-demand considerations, while the recent weakness in the U.S. market, where domestic quicksilver f.o.b. New York is now quoted at $215-$217, is also an unsettling influence.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

With the exception of tin, prices of metals dealt in on the L.M.E. have either held steady or advanced after a period of uncertainty over the week-end. Reports indicate that the demand for copper is increasing, that for zinc remains satisfactory, whilst that for lead is still disappointing: in the case of tin it is understandable that there is no definite tendency during the currency of the present meeting of the International Tin Council.

COPPER STRENGTHENS AGAIN

During the first part of the period under review, the copper market was listless with demand running below normal for this time of the year as the majority seemed to feel that the end of the strike in the U.S. was in sight and the producer's price, as soon as one became possible, would be 31½ c. per lb. On Monday, however, Kennecott announced that their new price would be 33 c. per lb. and this was sufficient to impart a firmer undertone to the London market. At the same time, more enquiries were reported from both Europe and the Far East and when, on Wednesday, it appeared that the U.S. longshoremen would reach a settlement with the employers before the expiry of the 80-day "cooling down" period, the London market became very strong.

Coupled with more interest being shown by consumers was the technical position of the market which caused the backwardation to increase rapidly and it seems probable that until the end of the year this situation may become aggravated, especially as stocks in official warehouses showed a decline of 150 tons at the end of last week and it is expected that the figures for this week will show further shipments.

The strike situation in the U.S. is still uncertain as all that is known is that negotiations between the Mine Mill Union and Kennecott are continuing and that some provisional agreement has been reached between the Union and Asarco: Anaconda and Phelps Dodge, however, still appear to be only in spasmodic contact with the Union. It is now estimated that the U.S. strike, together with the strike in Chile, has resulted in a loss of production of almost 250,000 tons and it is apparent that unless production recommences very soon, there may be a critical shortage of metal in January. The majority opinion seems to be that the general price level will rise over the next three or four weeks, that the backwardation will increase and be maintained at the increased figure until the end of the year, but that early in 1960 the whole level of the market will fall and the backwardation will be gradually decreased.

TIN MARKS TIME PENDING I.T.C. DECISION

The tin market has been featureless, although there has been some scattered selling on the expectation that the International Tin Council will raise the export quota during the course of its present meeting. Some feel that the export quota should be removed altogether but the majority consider that the time for such action is premature, especially in view of the uncertainty in the steel industry in the U.S. Stocks in official warehouses showed a further increase of 475 tons at a total of 8,185 tons.

The turnover in Singapore has been running at a high rate and the Eastern price on Thursday was equivalent to £792 per ton c.i.f. Europe.

According to the Straits Trading Co., exports of tin from Malaya during November totalled 7 tons from Singapore and 4,231 tons from Penang. These figures compare with the previous month's shipments of 8 tons and 5,185 tons respectively: the most interesting features of the statistics are the decline in shipments to the U.S., which are down by almost one-third, and a small shipment to the U.K., being the first for a long time.

LEAD FEATURELESS—SHORTAGE OF PROMPT ZINC

The lead market remains featureless and the elimination of the contango at the time of writing is probably only a very temporary feature. Demand in the U.K. is satisfactory but new orders in Europe are disappointing and the same refers to the trade in the U.S.

The zinc market continues to be characterized by a large backwardation and it is understood that tonnages of prompt metal are very hard to find. Consumption in the U.K., Europe and the U.S. can be termed very satisfactory, and its seems unlikely that the present tight situation will be relieved until some decision is come to about increasing the availability of supplies.

Closing prices are as follows:

	Nov. 26 *Buyers*	*Sellers*	Dec. 3 *Buyers*	*Sellers*
COPPER				
Cash	£237½	£238	£250	£251
Three months	£234	£234½	£238½	£238¾
Settlement	£238		£251	
Week's turnover	11,725 tons		8,200 tons	
LEAD				
Current ½ month	£70⅜	£70½	£71¼	£71½
Three months	£71⅛	£71¼	£71¼	£71⅜
Week's turnover	8,975 tons		6,275 tons	
TIN				
Cash	£794½	£795	£791	£791½
Three months	£793½	£794	£788	£789
Settlement	£795		£791½	
Week's turnover	890 tons		560 tons	
ZINC				
Current ½ month	£94½	£94½	£94½	£94½
Three months	£89½	£89½	£89½	£89½
Week's turnover	4,750 tons		6,425 tons	

London Metal and Ore Prices appear on inside back cover.

Mining Finance

Interims from Johnnies?

As shareholders in Johnnies must be aware, it's a good wind that blows nobody ill. Because of the way in which Johnnies' tax charge is calculated, the increase of £4,500,000 in the value of investments between mid-1958 and mid-1959 resulted in a tax liability of about £370,000, compared with a refund of about £680,000 in respect of the previous year's depreciation in share values. Taking into account the falls in investment income and investment realisation, therefore, the improvement in stock market conditions during 1958-9 left Johnnies about £1,000,000 worse off on appropriation account. There was, of course, some compensation in the fact that the appreciation in value meant a much smaller appropriation to investment reserve.

All this, however, is past history. What is of the most immediate import is that J.C.I.'s future now looks brighter than it has done for some years past, since, in fact, 1955 when metal prices were high and Freddies North and South Lease Areas were promising newcomers. The improvement extends to almost all aspects of Johnnies' business. Diamonds and copper are emerging — or have emerged — from the aftermath of the U.S. recession, and the improvement in copper dividends in particular should make a substantial difference to Johnnies' revenue next year. The platinum picture, too, is much better, and whereas last year no income at all was forthcoming from this important sector of the group's operations, the recent resumption of payments by Rustenburg will materially help the corporation. On the gold front, the flotation of Western Areas Gold Mining on the Waterpan prospect marks a revival of Johnnies' fortunes in prospecting, and the holding of 36 per cent of Western Areas' capital which remains in the corporation's hands should prove a most valuable asset.

All this must have weighed with Mr. D. A. B. Watson, the deputy chairman, when he stated at the annual meeting that next year's dividend rate should be "at least maintained". "At least" may be the important words here; on present indications there is a good chance, if no more, that next year's distribution will show a modest improvement, and the institution of interims next January — another indication of confidence — will provide a valuable pointer in this respect. Extracts from Mr. Watson's statement are on page 582.

GOLD CERTIFICATES WITH A DIFFERENCE

Yet another gold certificate scheme was launched this week. Backed by the Standard Bank of South Africa and Johnson Matthey, and sponsored by the International Gold Corporation, certificates are to be made available at various values ranging from about £21 for a 50 gram bar to £420 for a one-kilo bar. Special arrangements can be made for the issue of certificates representing other bars up to about £5,250 for a 400-oz. bar. The price of issue of any certificate will be related to the day-to-day price of gold, with a 3½ per cent premium to cover administration, and freight and insurance should the certificate be surrendered. No storage charge will be made for bullion.

International Gold Corporation is owned by a syndicate of South African businessmen, the largest participants being Mr. P. Friedland (chairman), a Johannesburg lawyer, and Mr. F. E. Levy, a member of the Johannesburg Stock Exchange. Like most of the other schemes, this one is aimed at the North American market.

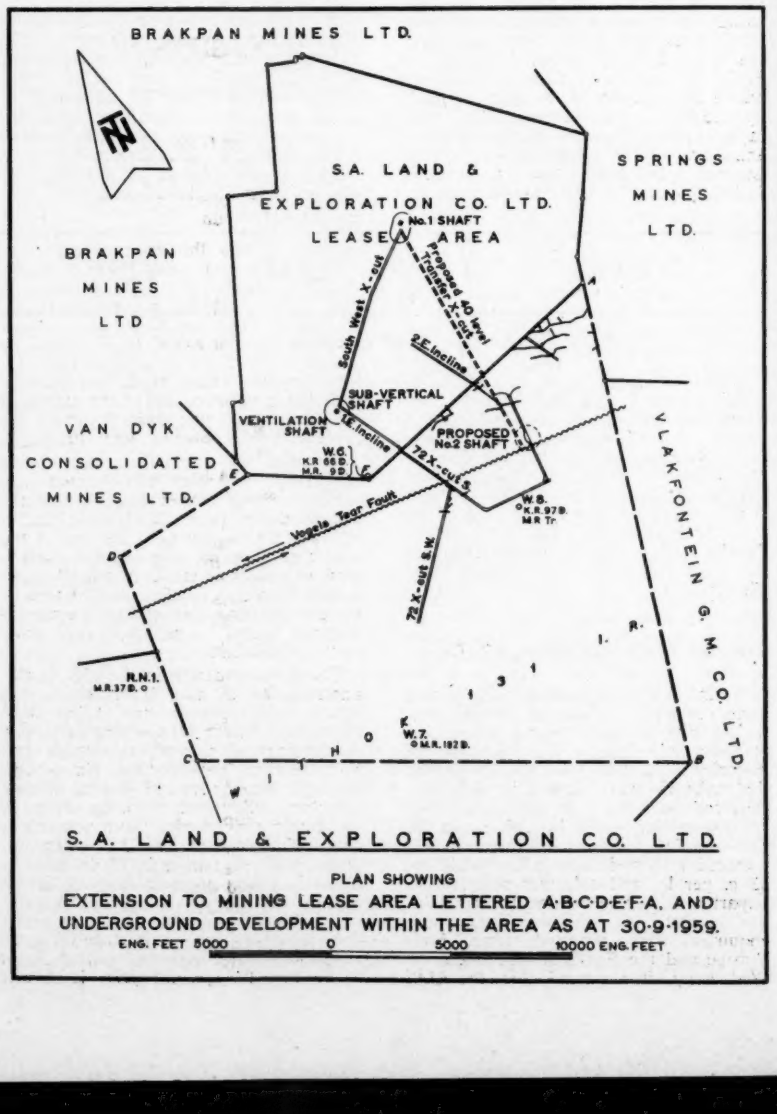
The main point of difference between the new scheme and its predecessors lies in the fact that the certificates will take the form of bearer bonds, making them anonymous and completely transferrable. The new certificates are, in fact, a form of currency fully backed by gold.

SALLIES' WITHOK PLANS

Full details of Sallies' plans for exploiting its Withok property have now been announced by the company. The published plan shows the extent of the work so far undertaken, together with the proposed site of the new shaft and details of that portion of Withok over which Sallies has been granted a mining lease.

Financing arrangements are straightforward. An issue of £2,000,000 six per cent notes, redeemable 1963-1967 is to be made in January, 1960. Shareholders on the register on December 31 will be entitled to subscribe for £4 of notes for every five shares held — a possible total of £1,980,000 — while Anglo American will take up £20,000 firm and will underwrite the offer to shareholders. The notes carry the right on June 30, 1963 of subscribing for two new 3s. 6d. shares at par for every £5 of notes held on that date. With a further firm subscription by Anglo, this will raise the issued capital from 2,475,000 to 3,300,000 shares.

All told, the two issues will raise some £2,140,000. This will leave about £1,000,000 to be appropriated from earnings over the next few years. Small wonder, then, that Sallies half yearly payment has been reduced to 6d. per share. Nevertheless, if income is not of prime importance, Sallies' shares, now quoted at 17s. offer an interesting alternative to investment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in the new mines, with the added spice of Sallies' low-grade areas which would come into their own should the gold price be raised.

AUSTRALIAN YIELD-SWEETENER

North Kalgurli has long been regarded as one of the best-behaved mines on the Golden Mile. Dividends have been paid regularly since 1933, while development has never met with anything more than minor setbacks. Last year's results were again highly satisfactory, with gold production reaching the record level of 96,547 oz. in spite of a fall in the head grade from 5.357 dwt. to 5.345 dwt.

The most important thing about N. Kalgurli, however, is that its best days still lie ahead. Over the last ten years large sums of money have been spent on modernising and expanding the mine, and although profits have recently begun to reflect this to some extent, the real pay-off is yet to come.

The one fly in the Kalgurli ointment, is the problem of costs, which, in Australia as elsewhere, show an inexorable trend upwards. In the 1958-9 financial year alone, the State Basic Wage applicable to the company was increased three times, to a total extent of 4s. 11d., while power from the Kalgoorlie Electric Corporation now costs about 3d. per unit. Had it not been for past modernisation projects Kalgurli might well be in a difficult position by now.

The present quotation is about 10s. 6d. to yield 8.2 per cent on the current dividend rate of 10½d. There may or may not be room for a slight improvement in this rate during the current financial year, but, in any case, as an eminently safe yield sweetener, N. Kalgurli is an interesting buy.

AN INTERESTING INVESTMENT

One of the small but interesting companies in the finance section of the market is National Mining, led by Mr. C. J. Burns, which has softened the absence of dividends for 1958-9 with the declaration of a 5 per cent interim on account of the current year.

National Mining is a portfolio company only partly committed in mining. Its name is also belied by the fact that its investments are nothing if not international —there are direct holdings in America, Canada, South and Central Africa, Malaya and Thailand, quite apart from the international character of such shares as Dunlop, Hawker Siddeley, Union Corporation and Rediffusion. Roughly half the investments (by balance sheet value) are quoted, producing a current yield of about 5 per cent with excellent prospects of appreciation (indeed, it is the realization of these prospects which has allowed the payment of an interim).

It is in the unquoted investments that National Mining's speculative interest lies, however, and particularly in the Mines Development Syndicate (West Africa). This company, in which National Mining has an investment equivalent to 25 per cent of the total balance sheet value of its investments, owns a lead-zinc property which has been thoroughly explored and which holds out excellent prospects for profits, once in operation. The difficulty has been that with lead and zinc prices at the depressed levels of recent years, working capital for a proposition such as this has been hard to come by, even though it is believed that M.D.S. could have shown a profit at very low metal prices. Now that the base metal position generally has improved, several major mining organizations have expressed interest and the property seems much closer to exploitation than has been the case hitherto.

Meanwhile, the income from the quoted portfolio should show a steady increase, allowing dividends of perhaps 10 per cent upwards, exclusive of profits on share-dealing and income from the Trinidad oil royalties. This would mean a yield of perhaps 8-10 per cent on the present price of 3s., a by no means unsatisfactory income from a share with the speculative appeal of National Mining.

LONDON MARKET HIGHLIGHTS

The South African gold share market managed to maintain its recently brighter tone during the week, but there was no further expansion in business. Johannesburg continued to set the running and an encouraging sign was the persistence of a modest London support.

It was confidently predicted that the December half-yearly Kaffir dividend season would bring some good payments and a certain amount of quiet buying based on this theory was noticed. West Driefontein, for instance, moved up to 192s. 6d. on hopes of a higher dividend this month and an improvement in Hartebeest (60s. 3d.) was backed by opinions that any likely cut in their payment had already been more than allowed for in the recent easier share price trend.

Free State Geduld (191s. 3d.) and Western Holdings (165s.) responded to fresh profit records in the November returns. These O.F.S. mines together with the Presidents Brand and Steyn, Welkom, St. Helena and Harmony, declare their dividends in the months of March and September.

One of the few dull spots was provided by St. Helena. The shares drooped to 82s. following vague rumours of disappointing underground development values; but it was considered more likely that the real reason for the dullness was indigestion at the Cape caused by arrivals there from London of recently purchased stock.

Otherwise, London came forward for West Wits (80s. 6d.) and Venterspost reached 22s., at which price they appeared to be offering an attractive profit to recent buyers. Firmness in the Finance group was notably in Gold Fields (96s. 6d.) and Selection Trust (126s. 10½d.). "Johnnies" at 78s. were helped by the deputy chairman's mention of rising investment income and the decision to start interim payments next month.

Bancroft became the exception to a generally firm copper group falling back from 29s. to 27s. 6d. The previous popularity of the shares, stemming from the official indication that dividends were not so very far away, was tempered by consideration of the company's heavy capital structure — there is no less than £13,000,000 in ordinary and participating preference shares awaiting dividends. Mangula (12s. 6d.) again attracted investment buyers and Chartered improved to 106s. on talk of a Johannesburg market being started in the shares.

As was anticipated here last week, the pause in tin shares did not last long. Renewed demand from Singapore and London soon had prices on the way up again. Tronoh rose to 30s. and Malayan reached a 1959 high of 36s. 6d. among many other gains. Beralt, however, tumbled to 32s. 6d. following news of plans to exploit big Canadian deposits of wolfram ore.

Feature of the lead-zinc market was the advance in North Broken Hill of 17s. 6d. to 115s. at one time. It followed the company's statement, the publication of which was taken to imply a coming free scrip issue.

Elsewhere, substantial buying from Africa of Falcon Mines raised the price to 11s. 6d.; the move was linked with talk that Falcon may be the next company to be acquired by the Rio Tinto group in their current plans for a development of the Southern Rhodesian gold industry.

DECENSION !

Once again the world shaft-sinking record has been smashed, this time by two mines. One of these, President Steyn, has also achieved the four-minute mile of shaft sinking by sinking 1,001 feet in a thirty day month. The previous record was 922 feet, achieved in the No. 2 shaft at Vaal Reefs, and the crew at this shaft beat their own record last month by sinking 954 feet.

The President Steyn No. 3 shaft, where the new record was set up, has the same dimensions as the Vaal Reefs' No. 2 shaft — 28 feet excavated diameter, 26 feet inside the concrete lining. Perhaps the most interesting feature of the new record is that it has been set up in the first full month of sinking. There is a strong possibility, therefore, that the record may go again in the next few months.

The relevance of these high-speed shaft-sinking achievements for the investor is that not only are overheads reduced, but that the shaft can be commissioned sooner, with a resultant earlier increase in profits. The progress made in this field by the S.A. gold industry is illustrated by the fact that in 1948-9, the best advance achieved in the No. 2 shaft at Welkom was 155 feet — less than one-sixth of the present record rate.

MERU IS RUNNING OUT OF LAND

The pressing need for a workable national land-alienation policy in Malaya was re-emphasized this week by the situation of Meru Tin, as reported by the chairman, Mr. S. L. Potter.

Meru is one of the oldest tin producers in Malaya. Its property has been worked continuously for more than 50 years, and, not surprisingly, the tin-bearing land remaining to the company is nearing exhaustion. Ten years ago, Meru made application to the government for some 3,000 acres of likely land, which had, in fact, been reserved for dredging. Nine

years after the application was first made, Meru was informed that it had been turned down. No reason was given.

Meru is, of course, only one of many companies for whom the land problem is a matter of extreme urgency, but its comparatively small size adds a life or death element to this particular case. The important thing, however, is that every dredge that ceases operations is potentially lost to the Malayan economy. The present climate for investment in Malaya is admirable; but without action in the near future, the country is liable to find itself with an excellent investment climate and no investments. This would be a disaster not only for Malaya, but for the Free World as a whole.

KAFFIR DIVIDEND SEASON OPENS

There were no surprises among the opening group of dividend announcements from the South African gold producers. Sallies, as explained elsewhere, reduced its payment to 6d. as forecast, while Daggafontein is now on a 4s. 6d. annual basis by virtue of another distribution of 2s. 3d. Absentees from the dividend list are Brakpan and Springs, both declining mines whose distributions are henceforward to be made in the form of capital repayments.

Company	*June* 1958	*Dec.* 1958	*June* 1959	*Dec.* 1959
Anglo American	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Dagga	2 6	2 6	2 3	2 3
E. Dagga ..	7½	7½	7½	7½
S. A. Lands ..	1 6	1 6	1 3	6
Vaal Reefs ..	1 6	2 0	1 6	2 0
Western Reefs	1 3	1 3	1 3	1 3

Financial News and Results

Tanganyika Diamond and Gold.—The result of 1958-9 operations of Tanganyika Diamond and Gold Development, parent company of Alamasi Limited, was a loss of £2,221, compared with a profit of £3,034 in the preceding year. After providing for expenditure on fixed assets, the carry-forward was reduced from £34,138 to £1,148.

No Expansion Yet at Blyvoor.—Answering a question at the annual meeting of Blyvooruitzicht, Mr. T. Reekie, the chairman, said that present throughput was in line with plant capacity, and that there were no plans for increasing this capacity in the near future. Referring to the results of exploratory development in the Western area of the mine, where grade and payability are expected to be lower than in the rest of the mine, Mr. Reekie said that it was impossible at this stage to estimate the effect of this development on mill yields.

Pusing Plans. — Subject to formal contract, shareholders' approval and Treasury consent, Pusing Rubber and Tin has accepted an offer of 2,000,000 Malayan dollars for its Bedrock Estate and mining leases. The price includes all buildings, plant and equipment on the Bedrock estate, but excludes stocks and stores. Once the sale has been completed, the greater proportion of the capital profit arising therefrom will be distributed by way of capital dividend, following which the company will probably be put into liquidation.

JOHANNESBURG CONSOLIDATED INVESTMENT COMPANY

(Incorporated in the Union of South Africa)

The annual general meeting of the Johannesburg Consolidated Investment Company, Limited, was held on December 1 in Johannesburg.

Mr. D. A. B. Watson, who presided in the unavoidable absence of the Chairman, **Mr. H. J. Joel,** said: Our investment income of £1,929,000 was less than that earned during the previous year, the decrease being of the order of £170,000. This reduction was the result largely of earlier unfavourable trading conditions in the platinum, base metal and copper industries, which conditions adversely affected the level of dividends received by us from those sources. I am happy to report, however, that there has been a satisfactory improvement in the outlook for these and most of our other fields of investment, and if this improvement is maintained, it is fully expected to result in increased investment income during the current year.

The anticipated improvement in the earning capacity of our investments is reflected in the rise in their market value at June 30, 1959, which value, after adding unquoted stocks at Directors' valuation, increased during the year from approximately £22,440,000 to £28,368,000. This increase of about £5,928,000 includes net additional investments made during the year at a cost of about £1,381,000, so that the actual appreciation in the market value of investments, both quoted and unquoted, was about £4,547,000.

The profit from realization of investments was £293,000, which is £140,000 less than the figure for the previous year. After allowing for various items of revenue and expenditure, the total profit of the company before taxation amounted to £2,041,000, which is about £300,000 less than that for the twelve months ended June, 1958.

Despite the reduction in gross profit, the charge for taxation for the year was considerably greater than that for the preceding year. Mainly because of the heavier provision for taxation, the profit available after taxation for the year was £990,000, as compared with £1,940,000 in the previous year. We have been able to maintain the dividend at last year's rate of 4/6d. while leaving the carry forward practically unchanged.

In the course of a detailed review of conditions and prospects in the various fields of investment, Mr. Watson, commenting on the diamond industry said: Total sales for the quarter ended September 30, 1959, were again at a very high level, with sales of gem stones reaching a new quarterly record, while the market for industrial diamonds returned to a level similar to that prevailing immediately prior to the U.S. recession of 1957/58.

Sales by the Central Selling Organization during the nine months to September 30, 1959, alone exceeded the total for the calendar year 1958, and our income for the financial year ending June 30, 1960, from investments in the diamond industry will almost certainly show an increase over that for the previous year.

Investments in copper producing and associated companies provide an important part of our dividend income. The profitability of the operations of those companies and our dividend income from them are naturally closely linked to the price of the metal, which over the past three years has been subject to wide fluctuations.

It seems likely that, with temporary fluctuations, stability will on the whole be achieved at prices acceptable to producer and consumer, and the prospects of the copper industry seem to be such as to ensure, over a long period, satisfactory returns on our investment in this field.

With regard to our investment in platinum, the profits earned by Rustenburg Platinum Mines during its financial year ended August 31, 1958, were materially reduced as a result of diminished demand and sales and a continuous fall in the price of platinum, and such profits as were earned were retained by that company to assist towards meeting the cost of the expansion programmes previously completed. The profit earned by the company for its year ended August 31, 1959, enabled it recently to resume dividend payments and the dividend received will be reflected in our investment income for the current year.

Apart from copper, to which I have already referred, our interests in base metals arise from investments in companies primarily engaged in the production of manganese, zinc, lead and antimony.

Our investments in South African industry, and South African colliery companies are more subject to the influence of changes within the South African economy itself than are our investments in the South African metal mining industry and, with regard to that economy, there was, during the year ended June, 1959, a decline in general activity. There are signs that this decline may now have been arrested. The immediate outlook for the Union may well now be one of somewhat improved conditions against a background of continuing overall development. No material change one way or the other is anticipated in the overall return which will be received from our investments in South African industries and collieries during the current financial year.

Once again gold production in the Union and revenue derived from gold and uranium, rose during the year mainly as the result of an increase in both the tonnage and the grade of ore milled by the newer mines.

Our income from investments in the gold mining industry, including uranium producers, increased during the year and it is anticipated that it will be maintained at approximately the same level during the year ending June, 1960.

I am confident that during the current year ending June, 1960, our income from investments will show an appreciable increase on the figure for last year, and, provided that there is no major depreciation in the book value of our investments, I am equally confident of our ability at least to maintain last year's rate of dividend. The Board has decided that, commencing in January, 1960, consideration will in future, be given at that time each year to the payment of an interim dividend.

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DOMINION REEFS (KLERKSDORP) LTD.

The twenty-fourth annual general meeting of Dominion Reefs (Klerksdorp) Ltd., will be held on December 23, 1959, in Johannesburg.

The following is the Statement of the Chairman, **Mr. S. L. Segal,** circulated with the Report and Accounts for the year ended June 30, 1959:—

The net profit for the year, after allowing for interest on the Uranium Loans and amortization of the Uranium project, amounted to £727,039 as compared with £610,066 in the previous year. This increase of £116,973 is mainly attributable to the higher revenue from the larger quantities of Uranium Oxide sold this year as compared with the 1958 sales. Mining and General Expenditure increased by £47,000, largely as a result of the greater tonnage mined, while unit costs remained practically unchanged.

Taxation, including the State's Share of Profits in terms of our mining lease, and including also a small underprovision in respect of last year, totalled £356,015, leaving a profit for the year, after tax, of £371,024 as against £450,016 in the previous year when, however, the amount of taxation was considerably less.

Last year we reported that we had worked off our previous assessed loss. The balance of our Capital Expenditure, of which in each year 27½ per cent. is presently allowed as a deduction for tax purposes, is diminishing and thus the impact of taxation is becoming more burdensome. For the year under review the rate of tax was just over 49 per cent. of our taxable income, and this rate may be expected to increase to approximately 52 per cent. of our taxable income this year.

Funds appropriated for Capital Expenditure amounted to £126,211, while Dividends Nos. 13 and 14 totalling 3s. per share, together with Non-Resident Shareholders' Tax thereon, absorbed £304,364, so that the unappropriated profit of £321,944 at the beginning of the year was reduced to £262,625 to be carried forward at June 30, 1959.

It will have been observed from the Directors' Report that the total sales of Uranium Oxide for the year were 535,916 lbs., as against a quota of 534,520 lbs. This small discrepancy arises from the fact that the quota is fixed in respect of the calendar year 1959 while our accounting period is in respect of the year ending June 30, 1959. While every effort is being made to ensure delivery of the Uranium Oxide at a regular monthly rate, minor fluctuations cannot be avoided. The excess delivery in the first half of this calendar year will be adjusted by delivering the requisite smaller quantity in the second six months of the calendar year.

Operations and Development

Since the close of the year, operations at the Mine have continued normally, and the following are the salient features of our results for the quarter ended September 30, 1959. The total tonnage treated was 125,780 yielding 133,472 lbs. of Uranium Oxide. The working profit amounted to £255,620, and after deducting the quarterly capital uranium loan repayment of £68,251, capital expenditure of £10,087, and taxation and State's Share of Profits estimated at £110,000, the balance of unappropriated profit was increased to £329,907. Development footage was 2,871 feet of which 2,546 feet was on Reef. The footage sampled was 2,500 feet, of which 1,370 feet or 54.80 per cent. was payable, averaging 1.52 lbs. of Uranium Oxide over a width of 38 inches.

An interesting, albeit minor, development is the decision to attempt to recover more gold from the ore mined from underground. The grade is so low —under a penny-weight per ton — that the capital cost of reconditioning the cyanide plant plus working costs make the cyanidation of all the underground ore completely uneconomic. Experiments, however, have revealed that a reasonable and economic rate of extraction can be achieved by flotation and submitting the smaller quantity of flotation concentrates to cyanidation. The necessary plant is presently being installed at a capital cost of some £31,000 and is expected to come into operation early in 1960. It is anticipated that our increased gold recoveries should yield an additional working profit of approximately £2,500 per month.

Since the close of the year, our former Chairman, Mr. M. E. Rich, found that increasing calls on his time made it impossible for him to continue as Chairman of our Company. He has accordingly resigned that position, but I am glad to say that he has agreed to remain on the Board as an ordinary director. My colleagues have honoured me by appointing me Chairman in his stead.

In conclusion I would like to express the Board's thanks to Mr. J. A. Royce-Evans and his Staff at the mine and those connected with the Mine at Head Office, for their loyal and efficient services during the year.

Company News

Head Wrightson Iron & Steel Works Engineering is building an iron ore sintering plant at Colville's Clyde Iron Works, Glasgow. This will be one of the largest single-strand sintering units in Britain, with a daily output of 2,500 tons of blast furnace sinter. The total value of the order is about £700,000, and the plant, the second of this type which Head Wrightson have supplied to Colvilles, should go into commission by the middle of 1961.

*

Broom and Wade have established a subsidiary in Belgium, Broomwade-Belge S. A., to control the requirements of that country, and also of Luxemburg and the Belgian Congo. The main purpose of the new company is to improve sales and servicing. And with the European Common Market in mind, at a later date, to assemble compressor units and portable plant locally, the compressors to be supplied by the parent company.

*

Marion Power Shovel Co. excavators and cranes in several models will be manufactured in Scotland at the Dalmuir works of Babcock and Wilcox Ltd., under an agreement announced today by James Mullaney, president of Universal Marion Corp., of which Marion Power Shovel Co. is a division. These machines will be marketed and serviced by Blackwood Hodge and Co. Ltd., 25 Berkeley Square, London, W.1. Customers in many parts of the world, as well as the companies involved, are expected to benefit considerably from this new combination of European manufacture and sale with Marion's 75 years of experience in product design. Marion Power Shovel Co. manufactures a complete line of diesel and electric-powered shovels, cranes and draglines ranging in size to the world's largest 65- and 70-yd. stripping shovels.

*

The Timken Roller Bearing Company and The Fafnir Bearing Company of New Britain, Connecticut, U.S.A., have announced that an agreement will shortly be concluded by which a recently formed subsidiary of the latter, Fafnir Bearing Company Ltd., will purchase the business of Fischer Bearings Company Ltd., a Timken subsidiary. The sale of Fischer, which was until recently owned by the former British Timken Ltd., results from the Timken decision to confine their interest to the manufacture of tapered roller bearings throughout the world. They will, however, continue for the present, to distribute FBC bearings for replacement purposes in Britain, through their subsidiary Timken Stockists, and in Australia, South Africa and Canada, through their branches in those countries. It is intended that Fafnir's British products will be marketed under the Fafnir name and that the business will be expanded to meet the anticipated increase in demand in both British and world markets and in particular the overseas factories of Fafnir's American customers.

Mr. Stanley M. Cooper, chairman of Fafnir, will assume the position of chairman and Managing Director of the English company and will direct reorganization and expansion, assisted by Mr. William L. Hubbard.

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AUSTRALIA

Capital sought to develop large proved deposit — Full data available London — open discuss co-operative development or outright sale. Box 651, *The Mining Journal*, 15 Wilson Street, Moorgate, London, E.C.2.

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